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The Thirty-fourth Annual Report

of the

UNIVERSITY OF MARYLAND

Agricultural Experiment Station

1807-1856-1920

College Park, Prince George County, Maryland.

1920-1921

Published by the Station

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The UNIVERSITY OF MARYLAND
AGRICULTURAL EXPERIMENT STATION

Volume 34 1920-1921

THE THIRTY-FOURTH ANNUAL REPORT OF THE MARYLAND AGRICULTURAL EXPERIMENT STATION.

For the Fiscal Year Ending June 30, 1921.

By H. J. Patterson, Director

To the Governor of Maryland and The President and Board of Trustees of the University of Maryland.

Gentlemen:—I submit herewith a report on the progress of the investigational work conducted by the Agricultural Experiment Station of the University of Maryland for the fiscal year ending June 30, 1921. This report is required by the Federal law and its purpose is to indicate briefly how the Federal and State appropriations for investigational work have been utilized. The report covers only the work in progress or completed during the past fiscal year together with some suggestions for extending and improving the work so as to increase its usefulness to the farmers of Maryland.

The Agricultural Experiment Station is the recognized center and source of agricultural information. Since the Establishment of the Experiment Station by act of Congress in 1887 a corps of workers have carried on investigations on the important problems which have confronted Maryland farmers, and have obtained results which have helped many farmers to procure a greater profit from their laborers and which have greatly advanced the agriculture of the State.

It has been the aim of the Station Staff to work in close cooperation with the farmers of the State and to deal with practical problems. The investigations conducted with soils, fertilizers, wheat, corn, hay, forage crops, tomatoes, cabbage, potatoes, tobacco, strawberries, apples, peaches, hogs, poultry, and dairy cattle have yielded results that are returning to the farmers of Maryland many times the annual expense of the Station work, and the annual value of some of the work more than equals the entire cost of the Station since its establishment 32 years ago. The Maryland Agricultural Experiment Station invites a larger interest in its work on the part of all citizens and particularly the farmers. The Station is supported by State and National funds and its business is to serve the people and promote Agriculture, the largest undeveloped Natural resource of Maryland. The only limitation as to the service which the Station will be able to render is determined by the amount of funds available for its work. The Citizens of the cities and towns of the State are concerned as to this agricultural development, as it directly influences their food supply. Maryland farms are fortunately located with reference to markets and the soils are peculiarly suited to the growing of products for human consumption. The ultimate development of Maryland agriculturally, will be largely towards the production of foods. Appropriations for investigations must be regarded as investments, not expenses, burdens or gifts.

WHAT THE EXPERIMENT STATION IS DOING FOR THE FARMERS.

PROGRESS OF INVESTIGATION.

Soil Resources: The Experiment Station in cooperation with the U. S. Bureau of Soils and State Geologist has made a classification of all the soils in the State and surveyed the State so as to determine the distribution and area of each class. The survey of all the Counties has been completed except Garrett. The survey of this County should be completed during 1922. On the completion of the soil survey the Station will be able to make an inventory of the soil resources of Maryland and make recommendations for the management of the different soil types based upon the results of the fertilizer and rotation tests in progress in different parts of the State. The Station has soil management and fertilizer investigations in progress in nine Counties on the predominating soil type of each County. This work involves keeping the record of 769 separate plats. The results obtained in this work would justify its extension so as to reach every County and all the soil types. If the farmers of St. Mary's County would apply the information gained from the tests made on the principal soil type of that County it would increase the production in that County by 400,000 bushels of corn, 170,000 bushels of wheat, 1,600 tons of hay and 3 million pounds of tobacco. An Examination of Maryland farm lands would indicate that at least seven acres out of every ten are acid, and should be limed in order to get the best yields.

Grain Crops: The staple farm crops of Maryland, cereals, forage and tobacco, represent about 67% of the total annual crop value. It is evident that investigations with these crops will always command the major interest of the farmers.

Corn: Tests of corn have shown that the varieties best suited to Maryland are Johnson County White, Boone County White, Reids Yellow Dent and Funks Yellow Dent. Maryland grown seed of these varieties have given better yields than seed from other States. The highest yields of silage has been procured from Cock's Prolific and Eureka. They have given 5 to 8 tons more silage per acre than other varieties.

Wheat: The Experiment Station has tested 160 varieties of wheat. The best five varieties on test now will yield over 20% more than the best five of 30 years ago. A survey of the wheat fields of the State indicates that about 70% of the acreage is planted to the higher yielding varieties which were introduced by the Experiment Station. On this basis, the Station work has added about 1½ million of bushels of wheat to the annual yield.

Soy Beans: The Station began growing soy beans in 1889. During this period many varieties have been tested, but so far only 15 have been found adapted to Maryland conditions. Of these the varieties known as Virginia and Wilson are outstanding for yield and dependability.

The Station has in progress experiments in crop rotation, green manure crops, rates of seeding crops, plant selections for yields and resistance to disease, plant breeding, hay, pasture and lawn mixtures, and top dressing and fertilizing tests all of which promise very useful and valuable results.

Tobacco: The studies in fertilizing and rotation for tobacco farms have given exceptionally marked and valuable results. The continued work with the Maryland Mammoth tobacco, which was originated by the Experiment Station, has shown it to be one of the best varieties for Maryland conditions. It has given the highest yields and sold for the highest price of any raised in the State during the past three years.

Orchard Fruits: The importance of fruit growing in Maryland can be gained from the fact that there are over 3 million fruit trees growing in the State, and the annual sales represent about 10% of the total crop values. The Station has some very important investigations under way on orchard fertilization, cover crops for orchards, pollination of orchards, factors influencing biennial bearing and rejuvenation of orchards. The results on rejuvenating an old peach orchard show that the work when properly done will make an orchard over in one season, and put it in shape to give profitable yields the next year.

Several promising early apples have been secured from the breeding work. The results in grape training indicate that the three wire Kniffin system is best for Maryland conditions. The breeding work with grapes gives promise of a good early dark colored grape, especially suited to Maryland.

Small Fruits: Work is in progress in testing varieties, culture methods, and effect of fertilization on strawberries, raspberries, blackberries and some other bush fruits. The freeze the past spring destroyed this year's crop.

Market Garden Crops: The annual returns from market garden crops represents about 18% of the total value of all crops grown in Maryland, or in other words about twice as much as the orchard fruits. Tomatoes. Irish potatoes, sweet potatoes, cabbage, sweet corn, spinach, cantaloups and asparagus have been given a prominent place in the market garden investigations. Special attention has been given to the development of disease resistant strains, or varieties of these crops, but this investigational work has also included studies of cultural methods, fertilization, crop rotation, tests of varieties, etc. Considerable work is in progress on studying available substitutes for stable manure for fertilizing market garden crops. The disease resistant strains of tomatoes which were developed at this station has been of great value to the canners of the State. This means much when it is remembered that Maryland packs about 45% of the output of the United States. Much progress has been made in developing disease resistant strains of cabbage and cantaloups.

The fertility studies have shown that market garden crops respond favorably to application of lime and that many of the ideas as to this class of crops preferring acid soils are erroneous. The value of lime for sweet potatoes and spinach has been particularly marked. Results would also indicate that many of the soils used for market garden crops are especially deficient in available potash. The growing of seed for market garden crops has received attention particularly with cabbage, cauliflower, cantaloups, peas and sweet corn. Results would indicate that specially selected home-grown seed has enough merit to make this project worth while. Storage problems are being studied with onions, potatoes and fruits.

Floriculture: Much work is being done with flowers which should be a benefit to both commercial and pleasure growers. The following are a few of the problems receiving attention: Factors which influence the splitting of the calyx of carnations. The use of artificial (electric) light to give a longer day in winter has hastened the blooming of snapdragons and lupines. A study of the influence of the kind of bed, and under-drainage on green-house chrysanthums, and sweet peas, cultural and fertilizer studies in growing carnations and roses. Improvement of varieties by selection of stock and soil.

The Station has established in cooperation with the American Dahlia Society a test garden at College Park. The unusual weather conditions were very unfavorable for this work during the 1921 season.

Plant Physiology: Many of the problems connected with the growth of plants, the disease of crops insect attacks of crops and the factors influencing the ripening, storage and conservation of fruits, vegetables and grains are dependent upon the physiological and chemical conditions and changes. These are the factors which are receiving the attention of Station Specialists in plant physiology. The results obtained in connection with seed potato investigations should greatly increase the average yield, and be worth large sums to the growers of this crop. The investigations on sweet corn should help the canners to improve the quality of their product, and make it more salable at better prices. This department is also making investigations of the nutrition requirements of the potato, spindling sprout disease of potato tubers, potato mosaics, factors influencing the maturity of potatoes, and factors influencing the hardiness of peaches.

Plant Diseases: The loss to farmers from crop and fruit diseases each year amounts to enormous sums, and methods for their prevention and control are important factors in his work. The following diseases have received the special attention of the plant pathologist during the past year: Fruit rots, corn root rot, fungi in corn ears, seed diseases, tomato blight and pear root rot. The breeding of disease resistant varieties and strains has received much attention as this seems to be a profitable field for research as the results are easy for the farmers to put in practise, and they are complete and far reaching. The welt resistant tomato strains developed by the Pathologist of the Maryland Experiment Station are now on the market, and used in several States, and are producing for agriculture annually many thousand times the original cost.

Insect Control: The importance of protecting crops, fruits and animals against insect ravages is impressed upon farmers every year. The farmers who practise the control methods advised by the Entomologist saves thousands of dollars in crops, and the farmers who fail to spray lose much. The Station Entomologists are working on the following problems: Control of Peach Tree Borer, Control of the Boxwood Leaf Miner, Control of the Chrysanthemum Gall Midget, Control of mealy bug, red spider, thrips, aphids, and scales in the Green house. Comparative value of sulphur compounds, nicotine preparations, cresote compounds, pyrethreum preparation, spreaders and adhesive insecticide, repelling stable flies, winter protection of bees. The results with the use of paradichlorobenzend for the killing and control of the peach tree borer would seem to indicate that a practical solution of this vexing question has been secured.

Animal Husbandry: There has been a very small amount of money available for investigating animal industry problems. Some of the projects in this field have become dormant. on account of changes in Station Staff. There is opportunity to do much to benefit and develop the live stock husbandry in Maryland, as soon as funds are provided.

Poultry Investigations: The following matters have received the attention of the poultry department: A study of the factors influencing egg hatching; A study of the sources and remedies of gape worms; The development of poultry methods and appliances; Test of the suitability of lime stone grit as a substitute for oyster shell and granite grit; Feed rations and problems; Poultry culling and its relation to profit and elimination of diseases. Much better facilities and more for maintenance expenses should be provided for the work in the interest of this important industry.

Hog Industry: The investigation with hogs has been confined the past year to questions which would give a better knowledge of methods for the control of hog cholera. A survey of hog raising in Maryland would indicate that cholera is the principal drawback to its profits and development. A preliminary report upon these investigations will probably be issued next year, but it will require at least three more years to complete the work outlined.

Biological Laboratory: In addition to the research work with hog cholera this laboratory has also made a careful study of gout in geese, and done much on black leg in cattle, and testing an ozoning machine as an auxiliary in ventilation. This laboratory has distributed during the year about 600,000 C. C. Anti-hog cholera serum to the farmers of the state, and prepared and distributed 1422 tubes of culture for inoculating legumes and about 32,000 C. C. tuberculin. This laboratory has diagnosed trouble with about 400 animals representing 10 different species.

Dairy Farming: Is one of the important industries in Maryland and many of the problems pressing for solution should be receiving the attention of our Station. The lack of funds has necessitated cutting down this phase of our work, some important projects are dormant, and nothing is available for new projects. A study of the cost of producing milk with cows kept and fed under varying conditions is being made. Also a study of the protein requirement of

growing heifers. Some breeding problems are also in progress.
For a complete list of projects see 32nd Annual Report.

PUBLICATIONS

The Station's appropriation for printing is not sufficient to provide for publishing the results of investigations promptly.

There is also need of having money available for reprinting some bulletins, the original editions of which have been exhausted. The bulletins are sent free to all farmers in Maryland who request them. There are about twenty-thousand names on the Stations general mailing list. The Station also has special mailing lists so as to be able to send information to farmers interested in special crops. The Station issues from six to ten bulletins each year. The system of handling the printing by the State Purchasing Bureau has prevented the issuing of bulletins promptly the past year.

The following bulletins were issued during the fiscal year 1920-21:

1920	*Number*	*Subject.*	*Author*	*No. Pages*
July	237	Variety tests of Corn, Wheat & Soy Beans....................	J. E. Metzger	24
July	238	Seed Inspection in 1919.........	F. S. Holmes	30
Oct.	239	The Relation of Green House Pests to the Transmission of Geranium Leaf Blight...................	P. Garman	26
Nov.	240	Internal Fungus Parasites of Agriculture Seeds.................	C. C. Chen	30
Dec.	241	Annotated List of Halticini......	A. B. Duckett	45
1921				
Jan.	242	A Comparison of Different Forms of Lime.......................	A. G. McCall.	10
April	243	Seed Inspection in 1920..........	F. S. Holmes	20
June		Thirty-Third Annual Report.....		

These bulletins made a volume of 186 pages for the year . The Station Staff have contributed numerous articles of a popular nature to the Agricultural papers, and many technical papers to scientific meetings and Journals.

BUILDINGS, LAND AND FACILITIES

The present station buildings need considerable repairs which should be made at once, and these buildings do not provide as much room, or as good facilities as are desirable for the work in hand. The fire hazard is great with laboratory and investigational work. A new, fire-proof, modern and well equipped building should be provided for the Experiment Station work. All of the station departments need more men, more apparatus and other facilities in order to handle the problems confronting farmers, and give them the help they desire promptly. If the Experiment Station is to render the service which farmers justly expect, it should keep in advance with its investigations so as to be a real leader, and not be trailing behind. The present station farm does not provide enough land for its requirements, and much of the land is not suited for new problems. The difficulty can be met in part by renting land in different parts of the state, but for some classes of work it is essential to have suitable land at the central station.

THE STATION STAFF

The research staff of the Station has a total of 25 persons. Six of these devote their whole time to investigational work, and others give some time to College duties.

If much is to be accomplished by investigators, they should not be handicapped by duties that break up their time or take their minds off their investigations. The College should be provided with sufficient teachers to take care of its work without encroaching on the investigator's time, and the investigator's teaching should be limited to not more than 10 or 12 lectures per year to advanced students. The good investigator should be paid as much as he could earn in an executive or commercial position, so as to encourage him to remain and confine his energies to his investigations. This is the only policy which will give stability to investigational work, and make for that progress which its importance warrants. The employment of labor through the State Merit Board has caused delay and lowered, rather than raised the standard and quality of the labor personnel.

The changes in the Station Staff during the past two years has been confined to the assistant positions. These changes have not necessitated much change in policy or character of work. There are some projects which are dormant as positions vacated during the World War have not been filled as it has been found best to use the funds thus released to provide properly for the other work. R. S Allen resigned to accept a position in the U. S. Department of Agriculture. G. R. Stuntz, Assistant Agronomist transferred to County Agent Work in the Extension Service, and R. Lee Sellman, Graduate of the University of Maryland class of 1919, was appointed to fill this vacancy. J. R. Haag resigned to accept a position at Pennsylvania State College. R. C. Towles resigned to engage in commercial work with the Virginia Carolina Chemical Co. E. V. Miller resigned to take up missionary work in China. J. P. Jones resigned to accept a teaching fellowship at Cornell University. S. V. Eaton resigned to take up post graduate work at Chicago University. W. R. Ballard transferred to the Extension Service.

FINANCIAL CONDITION

The decrease in the purchasing power of appropriations has made it necessary to allow many investigations to become dormant, and also made it impossible, except in a few instances, to meet the demands for new investigations. This condition has been unsatisfactory for both Station workers, and farmers. The circumscribed uses which can be made of appropriations under present laws makes it difficult to provide for emergencies, and this coupled with delays and arbitrary times set for making purchases through the State Purchasing Bureau has been expensive of time and money, and had a tendency to dwarf the energy of the investigators, and lessen the efficiency of the Station as a whole.

The prosecution of investigational work to the best advantage requires latitude in the expenditure of funds, and necessitates that workers shall procure supplies and facilities quickly, and without being hampered with indirect and arbitrary methods of transacting business. The nature of investigational work makes it impossible to forsee all requirements long in advance. The appropriation for the Experiment Station should be made in a lump sum to meet the requirements of the estimated budget submitted and agreed upon. The details of the expenditures of the Experiment Station will be found in the report of the University Accountant.

FINANCIAL STATEMENT

MARYLAND AGRICULTURAL EXPERIMENT STATION

In Account With

UNITED STATES APPROPRIATIONS

DR.

	Hatch Fund.	*Adams Fund.*
To appropriations for fiscal year 1920-1921	$15,000.00	$15,000.00

CR.

By Salaries	$12,182.49	$12,712.36
Labor	826.35	286.50
Publications	412.00	
Postage and Stationery..........	3.49	36.32
Freight and Express		2.00
Heat, Light, Water and Power...	178.27	659.82
Chemicals and Laboratory Supplies	55.23	459.84
Seeds, Plants and Sundry Supplies	489.56	196.99
Library	5.50	
Tools, Machinery and Appliances.	32.11	48.09
Furniture and Fixtures..........	599.25	102.72
Scientific Apparatus and Specimens	158.35	348.87
Traveling Expenses		67.43
Contingent Expenses	....	....
Buildings and Land	57.40	79.06
Total	$15,000.00	$15,000.00

MARYLAND AGRICULTURAL EXPERIMENT STATION

In Account With

THE STATE APPROPRIATIONS.

DR.

	General Fund.	*Ridgely Farm.*
Receipts for year 1920-21	$35,981.89	$4,565.01
Cr. Bal. June 30, 1920		3,481.12
	$35,981.89	$8,046.13

CR.

By overdraft June 30, 1920	$ 286.20	
Salaries	15,291.56	1,620.00
Labor	5,908.87	1,341.29
Publications	201.41	
Postage and Stationery	307.96	127.78
Freight and Express	828.29	113.62
Heat, Light, Water and Power	1,091.54	20.93
Chemical and Laboratory Supplies	245.79	16.55
Seeds, Plants and Sundries	523.15	498.03
Fertilizers	497.00	331.58
Feeding Stuffs	4,808.88	
Library	300.99	95.40
Tools, Machinery and Appliances	3,428.79	1,475.92
Furniture and Fixtures	68.23	20.58
Scientific Apparatus	134.15	
Live Stock	237.52	91.90
Traveling Expenses	822.74	212.52
Contingent Expenses	269.70	122.70
Repairs	609.12	568.53
Rent	120.00	
Credit Balance June 30, 1921		1,388.80
Totals	$35,981.89	$8,046.13

MARYLAND AGRICULTURAL EXPERIMENT STATION

In Account with the following:

Dr.

	Soil Fund.	*Farm Fund.*
Receipts for year 1920-21		$18,432.99
By payment of loan	$10,000.00	

Cr.

By overdraft June 30, 1920	$ 6,296.04	$ 2,790.80
Salaries	1,387.50	100.00
Labor	516.37	14,621.43
Publications		362.62
Postage and Stationery	5.00	29.55
Freight and Express	2.21	366.41
Heat, Light and Power	32.42	347.93
Chemicals and Laboratory Supplies	....	....
Seeds, Plants and Sundries	583.03	680.15
Fertilizers	157.97	568.25
Feeding Stuffs	....	2,548.53
Library	....	.56
Tools, Machinery and Appliances	....	499.56
Furniture and Fixtures	....	4.85
Live Stock	....	40.00
Scientific Apparatus	70.79	....
Traveling Expenses	770.84	708.00
Contingent Expenses	....	187.96
Repairs	....	56.70
Balance June 30, 1921	177.83	....
Totals	$10.000.00	$23.913.30
Overdraft June 30, 1921.	....	$5,480.31

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